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I, ANNA MAIJA EVERETT, ACTING TEAM LEADER EXAMINATION SUPPORT & SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. PQ 2118 for a patent by ALEX BABIJ JNR filed on 17 June 1999.

I further certify that pursuant to the provisions of Section 37 of the Patents Act 1990 Application No. 35107/99 was treated as a provisional application and reallocated no. PQ 2118.

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Thirtieth day of June 2000

A.M. Everett.

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A Screw Guide

Field of the invention

The invention relates to a guide for assisting engagement of a screw driving tool with a screw fastener during a fastening operation and also to a cartridge for presenting screws sequentially to the guide.

Background of the invention

In a fastening operation such as when a person drives a screw into a solid body using a screwdriver or power tool, it is often difficult for the person driving the screw to properly hold the screw whilst it is being driven, particularly during the starting period of the driving operation. This problem is particularly acute when the screw is to be driven into an inaccessible location such as a corner, for example.

Ensuring that the screwdriver properly engages the head of the screw can be difficult as it can require a fair degree of dexterity while the user attempts to locate the screw in the desired position for fastening. Holding the blade of the screwdriver in the head of the screw can also present difficulties.

Devices to facilitate guiding the screwdriver for engagement to the screw head in a fastening operation are known and one such device is disclosed in US Patent No. 4,139,036 (Regan). The Regan document discloses a guide device for a frictional fastening comprising a housing having an annual cavity extending therethrough for locating a screw inside and two oppositely disposed top and bottom openings located along a central axis of the housing. Mounted inside the housing at a distance above the bottom opening is a horizontal flexible sheet having a cross slit for receiving a screw aligned with the central axis and the openings.

A disadvantage of this device is that due to the pre-determined size of the bottom opening in the housing, the guide is limited by the size of the screw that can be passed through the guide. Furthermore, this device does not provide any positive indication when the head engages the bottom of the housing so that the user is unaware that the screw has completely been driven home.

Summary of the invention

According to first aspect of the present invention, there is provided a screw alignment device for assisting engagement of a screw driving tool during a fastening operation with a screw of the

type having a shank disposed between a head end and a front end, the screw driving tool being of the type having a shaft with a gripping formation at one end thereof and an engaging formation at the other end thereof for engagement with the screw head, the screw alignment device comprising:

a screw guide having a body of generally annular configuration formed from a resilient material and having an internal cavity of generally frusto-conical configuration tapering convergently towards a forward end of the body, the body having a slit therethrough aligned generally parallel with the cone axis;

a tool guide spaced rearwardly from the screw guide and aligned generally with the cone axis; and

a connector which connects the screw guide to the tool guide;

where, in use, a screw is located in the screw guide so as to be aligned generally with the cone axis, the front end of the screw projecting through said forward end and the head of the screw being held by the screw guide, and a tool with its shaft supported by the tool guide can be engaged with the screw head thereby holding the tool and screw aligned, and by driving the screw fowardly, the head of the screw will cause the screw guide to flex outwardly to permit the screw to pass through the screw guide.

The tool guide may comprise a pair of jaws defining a gap therebetween in which the shaft of the screw driving tool is located in use. The jaws may be resiliently movable apart from each other to increase the width of the gap so as to be able to accommodate a range of shaft diameters. The tool guide may be adapted to hold the screw alignment device to the tool or, alternatively, may be adapted to allow the tool to rotate relative to the screw alignment device during a screw driving operation.

Advantageously, the tool guide is formed of a resilient material.

Preferably the connector is an elongate shank having an axis parallel to the cone axis. Hence, a screw loading region is defined between the screw guide and the tool guide, for loading screws into the screw guide.

More preferably, the screw guide and the tool guide are formed on the opposite ends of the elongate shank. This can reduce the tooling required in the manufacture of the alignment device.

According to a further aspect of the present invention there is provided a cartridge for presenting a plurality of screws in succession to a screw loading region of a screw alignment device according to claim 1, the cartridge comprising:

a hollow housing having a screw feed channel within the interior of the housing and defining an opening being provided through a wall of the housing into the channel;

biasing means provided within the housing to bias screws located in the feed channel towards the opening; and

connection means for connecting the cartridge to the screw alignment device,

where in use, the plurality of screws are stored in individual succession on the screw feed channel so that each successive screw is moved towards the opening for insertion into the screw loading region of the screw alignment device in a fastening operation.

Preferably said one housing end is attached to the guide by a locking cap provided with an annular channel having and an axis aligned with the cone axis of the guide when it is located thereon. More preferably an engaging formation protrudes within the annular channel in a transverse plane to the axis for engaging the body of the screw guide.

Advantageously the screw carrier means comprises two lengths of oppositely disposed tracks having inner edges that are spaced apart such that the head of a screw can be located on each of the tracks between the spaces.

Advantageously the biasing means is a spring. More advantageously the spring is located at an end of the housing opposite the loading region.

Where in the specification the word "comprising" or "comprises" is used, this is to be interpreted to have a non-exclusive meaning.

Brief description of the drawings

Notwithstanding other embodiments which may be encompassed in the scope of the invention as defined broadly above, one embodiment of the invention will be now be described by way of example only with reference to the accompanying drawings in which:

Figure 1 illustrates in side view a screw alignment device for assisting engagement of a tool during a fastening operation with a screw according to the present invention;

Figure 2 illustrates the screw alignment device of Figure 1 in plan view;

Figure 3 illustrates in section view the screw alignment device of Figure 1 from the perspective of arrow "A" of Figure 1;

Figure 4 illustrates the screw alignment device of Figure 1 from the perspective of arrow "B" of Figure 1;

Figure 5 illustrates the screw alignment device of Figure 1 from the perspective of arrow "C" of Figure 1;

Figure 6 illustrates in cross-section, a cartridge for presenting a set of screws to a screw loading region of the screw alignment device of Figure 1, in accordance with the present invention;

Figure 7 illustrates the cartridge and screw alignment device shown in Figure 6 from the perspective of arrow "D" of Figure 6;

Figure 8 illustrates the cartridge of Figure 1 in cross section from the perspective of arrow "E" in Figure 6.

Figure 9 shows another embodiment of the screw alignment device in accordance with the present invention.

Figure 10 shows a screw of the type to be used in the guide illustrated in Figure 9; and

Figure 11 shows another embodiment of the invention in which the guide and cartridge are integrated into a single unit.

Detailed description of the embodiments

Referring to Figure 1 and 2, there is shown generally a screw alignment device in the form of guide 10, for assisting the engagement of a screwdriver with a screw such as the screw shown in Figure 10, during a fastening operation. The screw having a threaded shank 72 disposed between an head end 74 and a front drive end 76, and the screwdriver (not shown), of the type having shaft disposed between a gripping handle and an engaging end which can engage the head end 74, so that the screw can be turned in a clockwise direction in a fastening operation with a solid body.

The guide 10 has a screw guide 12 having a frusto-conical shape body which tapers convergently towards end 17 of the screw guide 12. The screw guide 12 is formed with an internal cavity in the form of cone 14 corresponding to the frusto-conical configuration that convergently tapers towards end 17.

The guide 12 also has a slit 16 formed through a side of the body, extending through to the cone 14 along the length of the body, from end 19 to end 17 of the screw guide 12.

A cone axis of the screw guide 12 is illustrated by the dotted line 18.

There is also provided a tool guide 20 aligned generally with the axis 18 and disposed at an opposite end 21 of the tool guide.

Connecting the tool guide 20 to the screw guide 12, is a connector 22.

The screw guide 12 is also provided with a cavity 24 (as shown in Figure 5, illustrating the tool guide 20 from the perspective of arrow "C" in Figure 1), which extends through the tool guide so as to locate the shaft of the screwdriver in use.

It can be seen from Figure 5, that the cavity 24 is open at 26 for allowing the shaft of the screwdriver to be clipped into the cavity 24, by forcing the shaft of the screwdriver through the opening 26. Alternatively, the engaging end of the screwdriver can be placed through the cavity 24 for location of the tool therein.

In this example of the invention, the tool guide 20 is formed of a resilient material which enables the tool guide to springingly grip the shaft of the screwdriver in a jaw-like manner and allows relative movement of the shaft with the tool guide 20.

Additionally the screw guide is also formed of a resilient material for allowing the screw guide 12 to flex and the slit 16 to open as the head 74 of the screw is driven by the screwdriver towards end 17 in a fastening operation as described below.

Suitable resilient material may be for the screw guide 12 and the tool guide 20, a resilient steel such as SAE 1074 flat high carbon spring steel strip having a thickness of 0.25 mm and a yield stress between 1600 to 1980 MPa. Alternatively, the material may be a plastic material of suitable resilience.

Additionally it should be noted that the guide 10 also defines between the end 19 of the screw guide 12 and the end 21 of the tool guide 20 a loading region 32 for allowing the screws to be loaded into the cavity cone 14.

Referring to Figure 3, there is shown the screw guide 10 from the perspective of arrow "A" of Figure 1. It can be seen that the cone 14 allows a screw to be located therethrough and that the slit 16 extends through the body of the tool guide 20.

Figure 4 illustrates in perspective view the connector 22 which has a base 26 and a pair of projections 28 extending from each edge of the base 26 to define a channel 30 between each projection 28. The connector can be made of any steel material and is preferably made from the same material as that of the tool guide 20 and screw guide 12. The connector 22 is integrally formed with the screw guide 12 at end 19 and with the tool guide 20 at 21.

In use, a screw of the type shown in Figure 10 is placed into the cone 14 such that the front end 76 is adjacent or projecting through the end 17 of the cone 14 and the head end 74 of the screw is located adjacent the end 19. The threaded shank 72, head 74 and front end 76 are aligned along the axis 18 while the shank of the screwdriver (not shown) is located in the cavity 24 and the engaging end of the screwdriver engages the head 74.

The screw is driven into a solid body by rotating the screwdriver in a clockwise direction so that the front end of the screw moves axially forward in a direction along the axis 18 towards end 17. In this way, the head moves from end 19 to end 17. Due to the resilience of the material of the screw guide 12, the slit 16 expands as the screw head 74 engages the sides of the cone 14.

It will be appreciated that in other embodiments of the invention, the tool guide 20 may completely engage the shaft of the screwdriver and the guide 10 may be rotated about the screw shaft 72 so as to drive the screw into the solid body.

As the head 74 moves closer to the end 17, the side edges of the slit 16 are spread further and further part until the head 74 is completely driven through the cone 14 at which time the slit suddenly retracts due to the resilience of the material, thereby producing an audible "click" sound.

It is thought that the audible click is a result of the slit 16 snapping back into its original position once the head has been driven through the end 17. Sound may also be produced as a result of the sides of the cone 14 being scrapped by the head of the screw 74 in a fastening operation.

It is an advantage of the invention that the click sound indicates to the user that the screw has been driven into the solid body. It will be appreciated that the audible click that is produced enables the user to know when to stop rotating the screw into the solid body and thereby prevent the user from applying an excessive force in rotating the screw and possibly threading or stripping the head of the screw and/or the engaging end of the screwdriver.

Furthermore, the slit 16 which expands also enables different sized screws having different sized heads (particularly large sized screws) to be used on the same guide device, thereby providing enhanced functionality over that of the prior art.

Additionally, there are no internal moving parts within the screw guide 12, which results in a simpler and easier to operate design than that of the prior art.

Referring now to Figure 6, there is illustrated a cartridge 34 for presenting screws to the screw loading region 32 of the guide 10. The cartridge 34 has an elongate hollow housing 36 open at end 33 and having a biasing means in the form of spring 40 attached at end 35.

Within the housing 36 there is also provided a screw carrier means in the form of two lengths of oppositely disposed tracks 38 which extend throughout the length of the housing 36 to the screw loading region 32. The tracks 38 are attached within the housing by a frame 44 which is attached to a top section of the housing at point 46.

A plurality of screws are located within the housing by locating the head of each of the screws between the space of the tracks shown generally as 46 in Figure 7. A better view of the tracks can be seen in Figure 7 which shows a view of the cartridge and guide 10 from the perspective of arrow "D". For further reference, Figure 8 shows a view of the cartridge from the perspective of arrow "E".

On the end of the spring 40 is located a lug 42 for contacting the screw adjacent to the spring 40 of the set of screws located on the tracks 38. The outer most screw being screw 48 has a threaded shank which is contacted by the lug 42 which pushes the set of screws in a direction shown by arrow "F" due to the bias of the spring 40. This ensures that the outer most screw at the opposite end of the tracks being screw 50 is pushed into the loading region 32, thereby enabling screw 50 to be fastened to a solid body using the guide 10 described above.

A lockable cap 54 is attached to the openable end by pushing a resilient lug 56 over projection 58 located on the external surface of the housing 36. In this way, the guide 10 is locked into the cartridge 34.

In this configuration, the lockable cap 54 has a channel 60 which is aligned with the axis 18 so that the connector 22 can lie thereon. The end 19 of the cone is located within an outer annual channel 62 so that the end 19 sits on the projection 64. In use, the guide 10 is prevented from moving out of the lockable cap 54 as the end 21 presses against an annular wall portion 66

located in outer annular channel 68, when the guide 10 is moved in an axial direction shown by arrow G.

In use, the set of screws are loaded onto the tracks 38 and the guide 10 is located in the lockable cap 54 as described above. When the screwdriver is removed from the loading region 32 after fastening a screw into a solid object, the spring 40 biases the lug 42 in the direction "F", thereby forcing the next successive screw into the loading region 32, so that it can be used as the next fastening screw.

It will be appreciated that an advantage of the cartridge is that it allows the automatic loading of the screws into the loading region and thereby reduces the loading time required to load the guide 10 in a fastening operation.

Although in this example of the invention, a screw of the type shown in Figure 10 has been described, it will be appreciated that other types and forms of screws can be used in this embodiment of the invention.

Figure 9 illustrates another embodiment of the guide of the presenting invention. For convenience, the parts of the guide have been labelled with like reference numerals as that of the embodiment of the guide 10 shown in Figures 1-5.

The difference in the embodiment of Figure 9 to that of the guide described above, is that the connector 22 is substantially longer and has an enclosed casing 70 which allows for a plurality of screws (of the type shown in Figure 10 and described above) to be loaded into the guide for maintaining each of the screws in succession along the length of the connector 22. It should also be noted that the a front engaging end 76 has a drive 76a. The drive can be seen more clearly in the enlargement circle of Figure 10.

The drive 76a is adapted to fit into a corresponding head end 74 of another screw, so that the screws can be each located within the connector 22 and successively enable each corresponding screw to be turned axially forward by a screw driver during a fastening operation. This enables successive fastening of a plurality of screws.

Figure 11 shows another embodiment of the invention similar to that described above however in this instance instead of a lockable cap provided at one end of the housing, the guide and the cartridge are integrally formed into a single unit.

It will be appreciated that although the above embodiments have described a tool in the form of a screwdriver, other tools for fastening screws are included within the scope of the invention, such as for example a screwbit connected to a power tool.

It will be understood that the invention disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text or drawings. All of these different combinations constitute various alternative aspects of the invention.

Dated this 15th day of June 1999

Alex Babij Jnr.
by his attorneys
Freehills Patent Attorneys

Claims

1. A screw alignment device for assisting engagement of a screw driving tool during a fastening operation with a screw of the type having a shank disposed between a head end and a front end, the screw driving tool being of the type having a shaft with a gripping formation at one end thereof and an engaging formation at the other end thereof for engagement with the screw head, the screw alignment device comprising:

a screw guide having a body of generally annular configuration formed from a resilient material and having an internal cavity of generally frusto-conical configuration tapering convergently towards a forward end of the body, the body having a slit therethrough aligned generally parallel with the cone axis;

a tool guide spaced rearwardly from the screw guide and aligned generally with the cone axis; and

a connector which connects the screw guide to the tool guide;

where, in use, a screw is located in the screw guide so as to be aligned generally with the cone axis, the front end of the screw projecting through said forward end and the head of the screw being held by the screw guide, and a tool with its shaft supported by the tool guide can be engaged with the screw head thereby holding the tool and screw aligned, and by driving the screw fowardly, the head of the screw will cause the screw guide to flex outwardly to permit the screw to pass through the screw guide.

2. A cartridge for presenting a plurality of screws in succession to a screw loading region of a screw alignment device according to claim 1, the cartridge comprising:

a hollow housing having a screw feed channel within the interior of the housing and defining an opening being provided through a wall of the housing into the channel;

biasing means provided within the housing to bias screws located in the feed channel towards the opening; and

connection means for connecting the cartridge to the screw alignment device,

where in use, the plurality of screws are stored in individual succession on the screw feed channel so that each successive screw is moved towards the opening for insertion into the screw loading region of the screw alignment device in a fastening operation.

3. A guide according to claim 1, wherein the tool guide has a body having a cavity extending therethrough.

4. A guide for assisting engagement of a tool during a fastening operation substantially as hereinbefore described with reference to the Figures 1 to 5 and 9.

5. A cartridge for presenting a set of screws in succession to a loading region of a guide according to claim 1, substantially as hereinbefore described with reference to the accompanying Figures 6 to 8.

Abstract

A guide 10 for assisting engagement of a tool during a fastening operation with a screw of the type having a shank 72 disposed between a head end 74 and a front end 76. The tool being of the type having a shaft with a gripping end and an engaging end for engagement with the screw head 74. The guide 10 further having a screw guide 12 having a body of generally annular configuration formed from resilient material and having an internal cavity 14 of generally truncated frusto-conical configuration tapering convergently towards an end 17. The body of the screw guide 12 also having a slit 16 therethrough aligned generally with the cone axis 18.

The guide 10 is also provided with a tool guide 20 spaced from and aligned generally with the axis 18 of the internal cavity 14 and a connector 22 is provided which connects the screw guide 16 to the tool guide 20.

In use, the shank 72 is mounted in the internal cavity 14 with its front end in a direction facing the end 17 and its head 74 being engaged by the tool in a fastening operation, whereby the head is accommodated by the slit 16 as the screw is driven towards end 17.

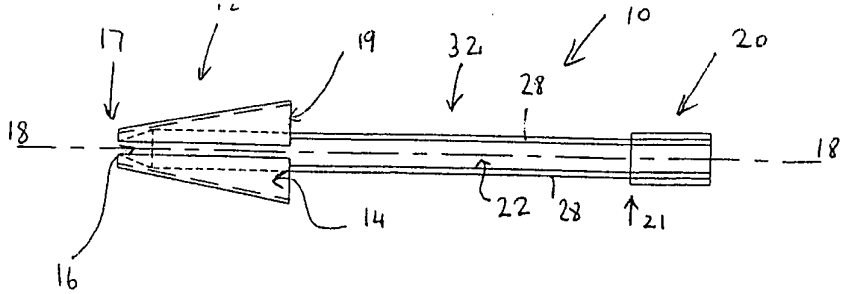

FIG 2

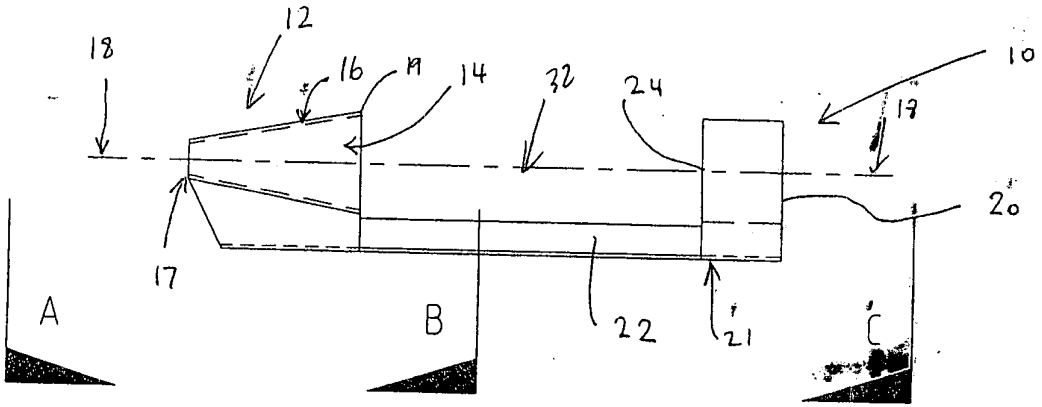

FIG 1

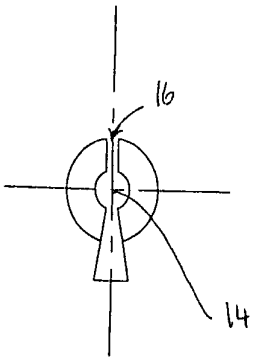

FIG 3

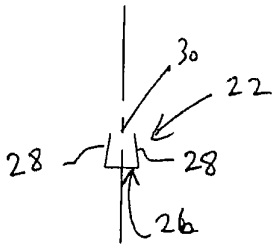

FIG. 4

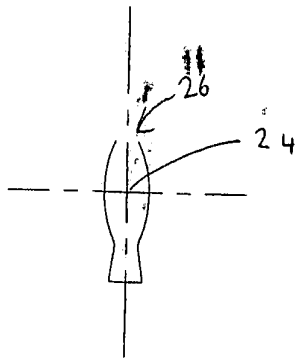

FIG 5

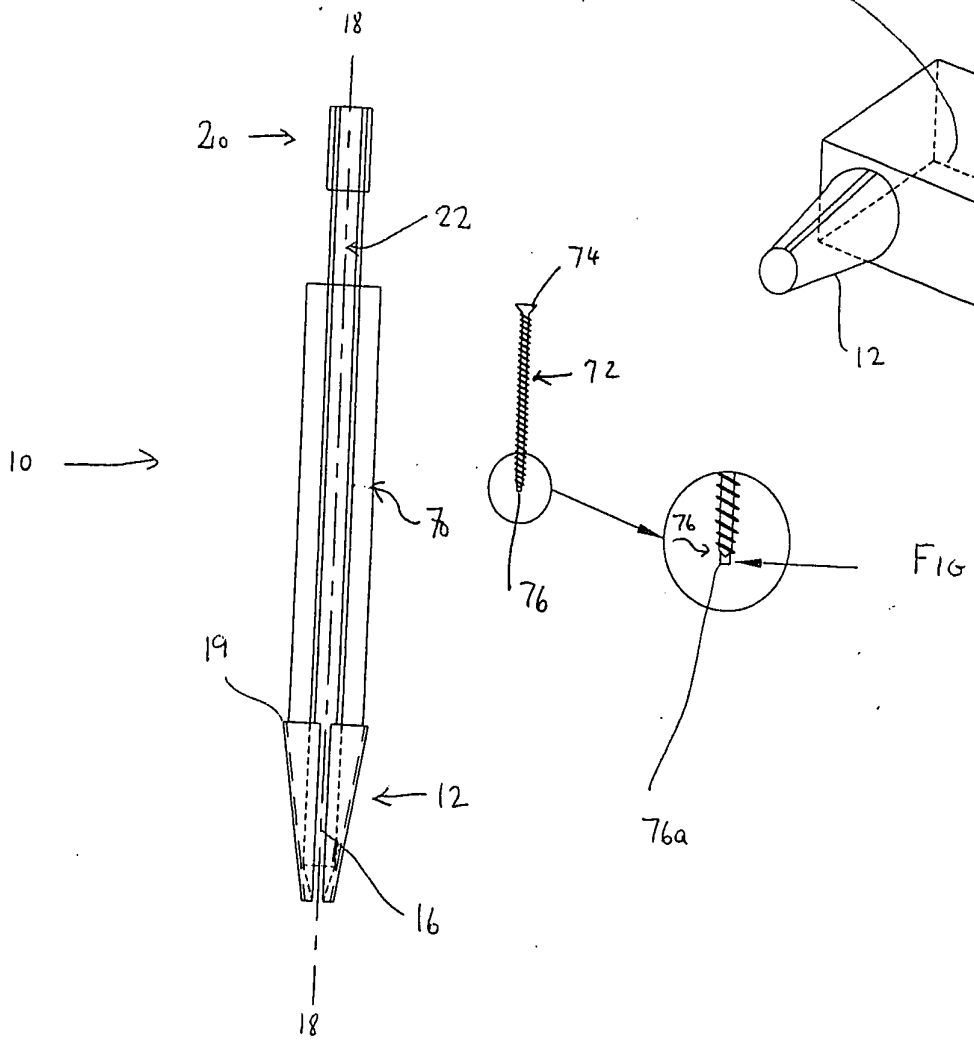

FIG 9

FIG 10

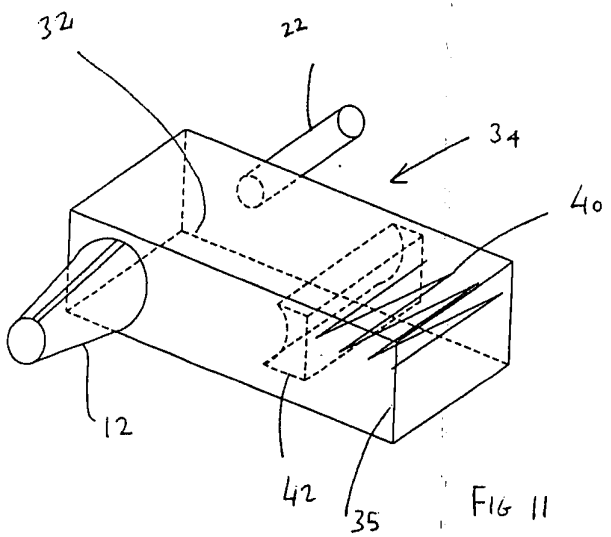

FIG 11

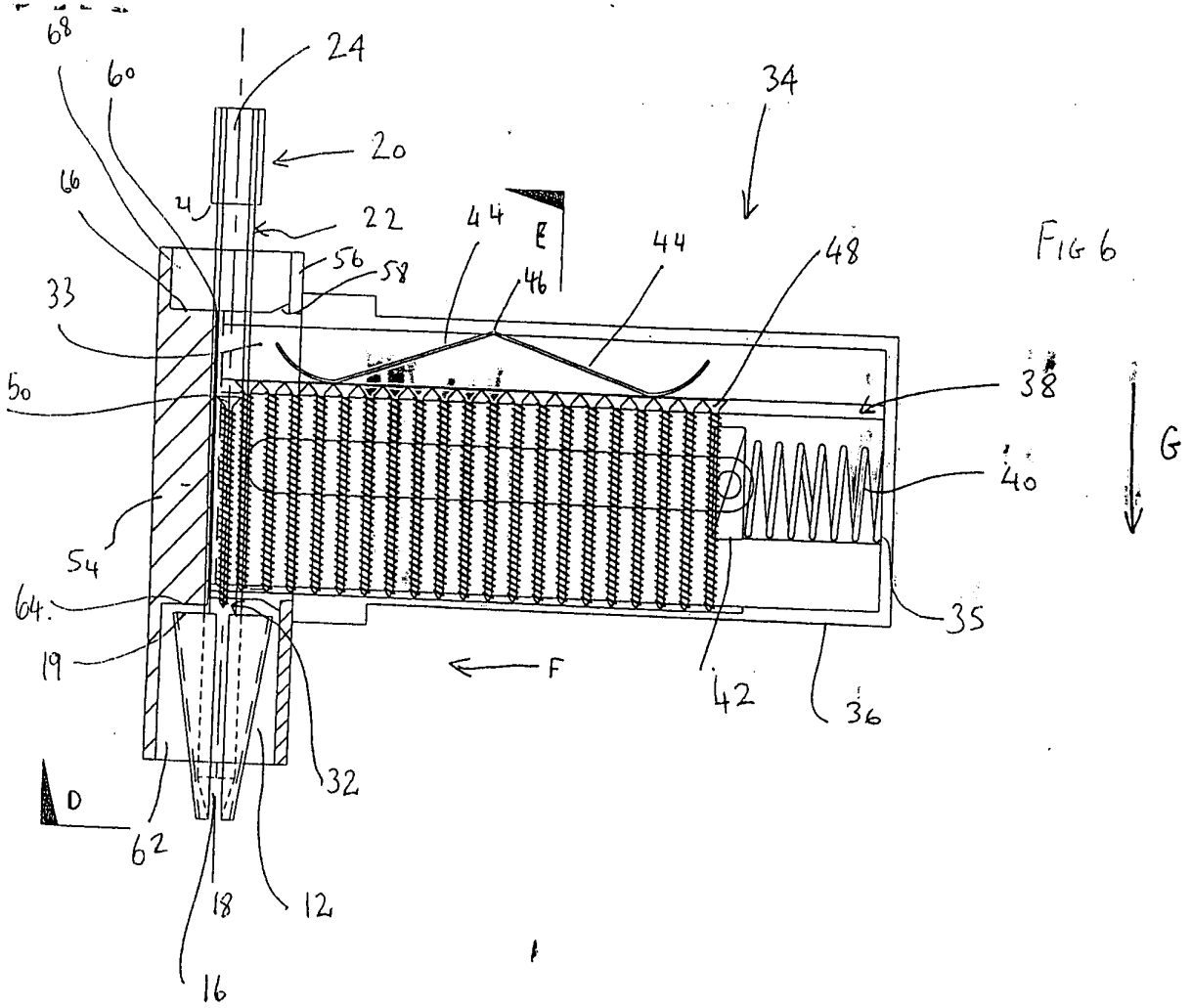

FIG 6

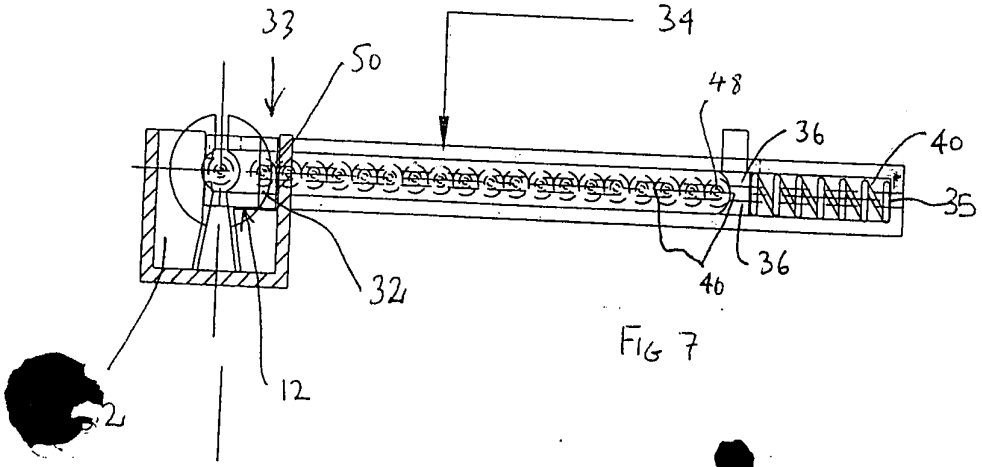

FIG 7

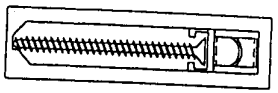

FIG 8